Field Report 16

DEMAND AND COST CONSIDERATIONS AFFECTING OILSEED PROCESSING

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Vietnam Ministry of Land Reform, Agriculture,
Fishery, and Animal Husbandry Development
and
Office of Food and Agriculture
U.S. Agency for International Development

July 1972

FOREWORD

This study is one of a series of marketing studies conducted by the U.S. Department of Agriculture in cooperation with the U.S. Agency for International Development and the Ministry of Land Reform, Agriculture, Fishery and Animal Husbandry Development of the Government of South Vietnam.

This marketing series is part of a still larger ERS Vietnam project. The first phase of the larger project was a review of Vietnam's 5-Year Rural Economic Development Plan, with a report published in December 1971. Other phases being completed now are a series of demand and price studies and a linear programming model to study production-distribution relationships for farm commodities.

The purpose of the several series of studies is threefold. The first is to develop a body of economic information from readily available sources for immediate use by the Ministry and USAID Mission in making decisions regarding development of Vietnam's agricultural sector. Secondly, the research methodology used and the economic information developed are to provide a basis for work by the recently-established Directorate of Agricultural Economics. Finally, it is expected that the participation of members of the Ministry staff in the conduct of these studies, together with any specialized training associated with the project, will acquaint them with the research procedures followed so that the analysis can be continued and improved in the future.

The marketing series, of which this report is a part, provides detailed descriptions of marketing systems for several major farm products, supplies marketing input data required for the production-distribution model mentioned above, and assesses the need for changes in the marketing systems. Assessment of the need for change was based primarily upon (1) the relationship of the costs incurred in providing the services required to move farm commodities from farms to consumers and the marketing charge, or margin, for these services; and (2) the extent to which the existing marketing systems provide the services currently required or expected to be demanded in the near future by growers or consumers. Covered in the reports are livestock products, oilseed processing, sugarcane and raw sugar processing, swine, poultry, horticultural crops, grains, and transportation.

Personnel of the Marketing Economics Division of USDA's Economic Research Service had prime responsibility for the studies under Participating Agency Service Agreement No. SA/VN(AJ)103-72. However, many others also deserve recognition for their cooperation and assistance, including other Ministries of the Government of Vietnam; the farmers, merchants, and others in Vietnam's private sector; and the staff of the U.S. AID Mission to Vietnam. Particularly helpful in this oilseed processing study were: Wayne Miles and USDA/PASA advisers Shelby Robert and Robert Ralston, all with the office of the Associate Director of Food and Agriculture, USAID; Neils Beck, USAID industrial adviser; the Chinese Agricultural Technical Group; and Tran Hoai Duyen, Vietnam Agricultural Economic and Statistical Service.

- William A. Faught
Project Coordinator

CONTENTS

SUMMARY AND CONCLUSIONS

Objectives for this study, which was conducted by the U.S. Department of Agriculture cooperating with the U.S. Agency for International Development, were:

1. To assess demand potentials for major products derived from oilseed crops; namely, vegetable oil and oilseed meal.

2. To estimate the cost and foreign exchange implications associated with importing refined vegetable oil and oilseed meal.

3. To determine the comparative costs associated with alternative processing and marketing systems for oilseed crops processed in South Vietnam.

Analysis of data collected to meet these objectives indicates that demand for edible vegetable oil and oilseed meal will make these products assume added importance in South Vietnam in the coming years.

Importation of refined soybean oil and soybean oil meal in quantities sufficient to meet expected market demands during the next 3-5 years would require an estimated U.S. $24 million per year in foreign exchange. In the absence of import duties, and with an exchange rate of VN$410/US$, expected prices to wholesalers for imported products would be approximately VN$206/liter of oil and VN$53/kg. of meal.

Economies of size evidently exist in oilseed processing (including oil refining and packaging). Consequently, larger processing plants could better compete with imported supplies of oil and meal than smaller operations.

As a result of the estimated relationships between oil and meal prices, the processing of oilseeds with higher oil content (copra and peanuts) would be expected to yield greater returns per unit of raw-product than processing oilseeds with a low oil content (soybeans). However, the production of all of Vietnam's edible vegetable oil requirements from peanuts and particularly from copra would not yield sufficient meal of the required quality to meet expected livestock feeding requirements.

By the same reasoning, prepress solvent plants, which recover a higher proportion of oil, would be expected to yield greater returns per unit of raw product than plants using only screw press extracting units. However, solvent extraction facilities require a higher initial investment per unit of capacity and require somewhat more labor and management skill for efficient operation.

Development of a viable oilseed production and processing industry in Vietnam would require the simultaneous development of a system for performing certain intermediate functions. These functions include raw product storage and assembly for the oilseed crops. Peanut shelling and copra production might also

be considered intermediate functions. These functions can be performed by the processor, the farmers, or some intermediate marketing firm. Arrangements or institutions which facilitate the transfer of ownership and the spreading of market risks as well as a system of market news or communications would also be required for efficient oilseed marketing.

DEMAND AND COST CONSIDERATIONS AFFECTING OILSEED PROCESSING IN SOUTH VIETNAM 1/

INTRODUCTION

South Vietnam appears to have the capability for increased oilseed crop production. Peanuts and coconut (copra) are traditional oil crops there and have been produced in substantial quantities (Table 1). Soybeans have also been grown in limited quantities as edible vegetables, but not as an oilseed for oil and meal.

Actual production potentials for these crops are not known. However, total volume could be increased by devoting additional resources to their production. Still greater volumes are possible through technological improvements such as better varieties, improved fertilization practices, and more effective disease and pest control. Oilseed production programs being implemented through the U.S. Agency for International Development (AID) will likely improve these conditions. Peanut and soybean production could be increased quickly. It would take longer (5-15 years) to substantially increase coconut or copra production due to the time required to bring new palm trees into production. There are also other oilseed crops, such as sunflowers, that might be grown in Vietnam.

Table 1.--Production of oilseed crops in South Vietnam, 1960-1970

Year	Cultivated area			Production		
	Coconut 1,000 Ha.	Peanut 1,000 Ha.	Soybean 1,000 Ha.	Coconuts 1,000,000	Peanut 1,000 M.T.	Soybean 1,000 M.T.
1960	41.8	28.4	4.3	186	24.2	2.8
1961	42.3	30.9	5.9	153	28.7	3.9
1962	43.4	33.6	5.5	168	28.6	3.9
1963	43.8	35.3	6.0	146	32.3	4.6
1964	41.6	35.0	6.0	141	36.5	4.0
1965	40.4	31.7	5.4	147	32.6	4.3
1966	39.0	30.6	6.6	129	34.4	7.6
1967	38.1	30.2	7.6	130	33.7	5.7
1968	29.9	29.7	7.8	111	32.1	7.5
1969	33.0	31.3	6.5	98	34.4	6.0
1970	32.2	30.2	7.0	118	32.2	7.5

1/ The assistance of Harry O. Doty, Agricultural Economist, Economic Research Service, U.S. Department of Agriculture, is gratefully acknowledged in the preparation of this report. Many other individuals also contributed to this research effort, although responsibility for any errors rests with the authors.

The extent to which increased production of these crops can be justified economically depends on:

1. Availability of markets and needs for oil and meal.

2. Cost of domestic oil and meal compared to competing imported products.

3. Comparative advantage of oilseed crops in relation to other possible uses of the resources (land, labor, and capital) required for oilseed production.

This study, part of a series of U.S. Department of Agriculture, Economic Research Service studies sponsored by AID, focuses upon the processing and marketing aspects of the problem. Subsequent phases of the project will deal more explicitly with alternative resource uses and the comparative advantage of competing agricultural enterprises.

POTENTIAL DEMANDS FOR EDIBLE VEGETABLE OIL AND OILSEED MEAL

Oilseed Processing in Vietnam and Consumption of Domestic Products

The production of crude peanut oil in small log mills and coconut oil in small mechanical presses in S. Vietnam was reportedly quite important in earlier times. In recent years, however, this production has declined. At present only very small quantities of these oils are marketed for human consumption and very limited supplies of high protein meal for livestock feed are available from domestic production. There are undoubtedly several reasons for this decline in domestic oilseed crushing. The two most often cited relate to the competition from subsidized imports of refined vegetable oil and the lack of available raw-material (oilseeds) at prices which processors can afford.

No official statistics are available on the utilization of oilseed crops produced in Vietnam, but some information was obtained for 1970 (Table 2). Members of the Chinese Agricultural Technical Group (CATG) estimated the production and consumption of crude peanut oil at 2,900 metric tons (M.T.) in 1970. This estimate is based on half of the peanuts produced going to direct edible use and the other half going to the small log oil mills for crushing. Approximately 35 percent of the crushing tonnage represented the weight of the shells, and 35 percent of the remaining weight was estimated to be recovered as oil. It might be noted that the official Government estimate of peanut production for 1970 in Table 1 was somewhat higher than the CATG estimate in Table 2. However, given the proportions and recovery rates stated above, this discrepancy in total production would not make a large difference in the net volume of peanut oil produced.

Table 2.--Estimated production and consumption of domestic crude vegetable oil in S. Vietnam, 1970

I.	Peanut oil 1/	
	A. Production of peanuts (in shell)	25,550 M.T.
	B. Volume of peanuts crushed (shelled equiv.)	8,287 M.T.
	C. Total production and consumption of crude peanut oil	2,900 M.T.
II.	Coconut oil 2/	
	A. Volume of copra crushed	24,000 M.T.
	B. Volume of crude coconut oil produced	12,500 M.T.
	C. Volume of crude coconut oil used for human consumption	1,250 M.T.
III.	Total and per capita edible consumption of domestic vegetable oils	
	A. Total edible consumption	4,150 M.T.
	B. Per capita consumption	0.24 Kg.

1/ Estimates from January 10 - April 9, 1971, Quarterly Report of the Chinese Agricultural Technical Group in Vietnam.

2/ Estimates obtained through personal interview with officials of Vietnam Coconut Oil Processors Association.

Estimates of coconut oil production and disposition were obtained through interviews with representatives of the Vietnam Coconut Oil Processors Association. There are about 25-30 members, half located in the Saigon area and the remainder in Kien Hoa Province.

All coconut oil processors use relatively small mechanical presses. These processors used an estimated 2,000 M.T. of copra per month during 1970, recovering slightly over 50 percent of the in-weight as oil. Unspecified quantities of copra were reported to have been imported from Malaysia and Singapore to supplement local supplies. Approximately 90 percent of the coconut oil produced was used for industrial purposes, with only 10 percent sold for human consumption.

Based on these estimates, the total volume of domestic crude vegetable oil consumed in 1970 in edible uses was only slightly more than 4,000 M.T. On a per capita basis, this amounted to about one-fourth kilogram.

Even less information is available on production and use of domestic oilseed cake. For peanuts, the volume and use of meal depends largely on whether the nuts are shelled prior to crushing. If they are not shelled, larger quantities of cake are produced, but it contains a high percentage of

fiber. Most of this is sold for fertilizer or a low-valued feed. If the peanuts are shelled, a high protein cake is produced, but much of this is sold for use in making soy-sauce or similar products. In either case, little, if any, peanut meal has been available for sale to commercial livestock operations.

Somewhat larger quantities of copra cake appear to be available on the basis of the volume of oilseeds crushed. Processing industry representatives stated that this was sold for feed, but at low prices. The quantity of copra cake which can be used in poultry and swine rations is quite low because of its high ratio of fiber to protein. Copra cake can be utilized more effectively for ruminant feeding. There is little evidence, therefore, that copra cake has provided an important volume of high protein meal for the commercial poultry and swine enterprises in S. Vietnam.

Consumption of Imported Vegetable Oil and Meal

Table 3 shows the volume of U.S. PL-480 refined soybean oil delivered to South Vietnam, as well as the volume purchased by the South Vietnamese Government (GVN) for distribution through civilian and military commissaries since 1966. These imports reached a peak of about 24,000 M.T. in 1969 and declined somewhat in the succeeding 2 years.

Table 3.--Refined vegetable oil imported under U.S. PL-480 and imports financed by GVN 1/

Calendar year	Food for Peace		GVN purchases
	Title I	Title II	
	Metric Tons		
1966	0	2,585	0
1967	0	10,217	0
1968	0	16,302	7,076
1969	0	19,914	4,004
1970	0	633	14,742
1971 2/	9,860	0	8,190

1/ Source: Compiled by Food for Peace, USAID/Vietnam.

2/ Through October 1971.

Data for 1971 are incomplete since they were tabulated only through October. Expanded purchases were programmed for September 1971 to August 1972, but it is too early to predict delivered volume.

No official statistics were found which refer specifically to imports of oilseed meals. However, estimates by the office of the Associate Director of Food and Agriculture/USAID-Vietnam placed such imports at about 20,000 M.T. in 1970 and possibly 25,000 M.T. for 1971.

Consumption of Animal Fats

Most fats and oils consumed by the Vietnamese in recent years appear to be from animal sources. This fat is mainly purchased and consumed as an integral part of the demand for meat and represents "invisible" consumption so far as fats and oils are concerned. However, pork fat and lard as distinct products are also sold in retail markets and consumed in substantial quantities.

No official statistical data are available on the volume of these products sold. However, the number of hogs produced and slaughtered has been increasing. In 1970, there were approximately 4 million hogs in S. Vietnam. Assuming that 100 percent of the hog inventory is slaughtered annually (in the United States, more than 100 percent of the hog inventory is slaughtered), and assuming that each carcass contains 10 kg. (lard equivalent) of saleable fat (U.S. lard production is over 10 kg. per hog slaughtered), then about 40,000 M.T. of edible fat in the form of hog fat or lard may have been consumed in 1970. It is questionable, of course, whether this volume was actually sold. However, it appears reasonable to assume that about 30,000 M.T. of fats and oils equivalent were actually consumed as hog fat or lard.

Potential Demand and Projected Requirements for Refined Vegetable Oil and Oilseed Meal

Present low rates of fats and oils consumption by South Vietnamese in relation to what are considered desirable nutritional levels indicate that much larger quantities should be made available in the future. The present estimated total consumption of about 54,000 M.T. of fats and oils means that the visible per capita consumption in Vietnam is about 3.1 kg. per year (Table 4). In contrast, the world average for 1970 was estimated at 8.4 kg. per person 2/. If the latter amount were considered as a nutritional goal, an additional 5.3 kg. per person would be required. Further, if half of this additional amount were supplied as hog fat or lard and the other half as vegetable oil, an additional quantity of over 45,000 M.T. of vegetable oil per year would be required.

In the case of oilseed meal, the additional "need" would appear to be even greater. Present use of oilseed meal in feeds is estimated at about 25,000 M.T. Additional quantities of oilseed meals are needed to produce more efficient rations and to sustain an expanding livestock industry. According to unofficial estimates by ADFA/USAID-Vietnam, over 1 million metric tons of feed grains were required for commercial swine and poultry operations in 1970. If only 5 percent of the feed grain ration were oilseed meal,

2/ See FAO Projections 1970-80: Oilseeds, Oils, Fats, and Oilcakes, Food and Agriculture Organization of the United Nations, November 1971.

Table 4.--Estimated total and per capita consumption of edible fats and oils in S. Vietnam in 1970

Source or type of oil	Total consumption	Per capita consumption
	Metric tons	Kg.
1. Domestic crude vegetable oil	4,150	0.24
2. Imported refined vegetable oil ...	20,000	1.15
3. Hog fat and lard	30,000	1.73
4. Total	54,150	3.12

approximately 50,000 M.T. would be involved. 3/ This is roughly 30,000 M.T. more than the estimated imports for 1970. Furthermore, commercial swine and poultry numbers, and hence feed grain requirements, are projected to increase substantially. By 1975, the projected feed grain requirement for commercial operations only is estimated at over 2.5 million metric tons. Five percent of that figure implies a need for some 125,000 M.T. per year of oilseed meals, or approximately 100,000 M.T. over 1971 imports.

On the basis of these crude estimates, it is clear that the demands for both edible oils and oilseed meals in the future will not be limited by "needs" or "wants." Rather, the limiting conditions would appear to involve the quantities which the country can afford either to produce or purchase. A variety of factors, in addition to the uncertainties of war, will influence these quantities. The prices at which the products are available will be an important determinant. Population growth and/or geographical distribution of population; changes in consumer or user purchasing power; and changes in tastes, preferences, and consumption patterns of consumers are additional variables that will govern effective demand.

For purposes of the analyses in succeeding sections, the quantity of vegetable oil that can be sold in the next 3 to 5 years was estimated to be 30,000 to 40,000 M.T. per year assuming prices at or near world market levels. This represents a slight increase in per capita consumption relative to present levels. Inherent in this estimate is the assumption that present programs favoring importation of oils will be discontinued, but that this will be offset by an expanding demand for fats and oils as the country develops economically. It is also assumed that vegetable oils will face substantial competition from animal fats as hog production continues to increase.

Future oilseed meal sales in S. Vietnam were estimated to be 50,000 to 60,000 M.T. per year, again assuming prices at world market levels. This represents an increase of roughly 30,000 M.T. above present imports. This

3/ In the United States, swine and broiler rations contain a much higher percentage of oilseed meal than 5 percent. Livestock nutritionists undoubtedly could make a strong case for using a higher percentage of oilseed meal.

estimate represents a compromise between the volume that can apparently be afforded at the present time and the volume "needed" in the future.

EXPECTED COSTS OF IMPORTING VEGETABLE OILS AND OILSEED MEALS

There are many different types of oilseeds, oils, and meals produced and marketed throughout the world. While most types are highly interchangeable for many purposes, each type has unique properties which tend to differentiate it for certain uses or markets. The fact that most countries produce some type of oilseed and virtually every country uses vegetable oils and meals means that these products are widely traded and prices are established at numerous trading points throughout the world. In light of these complexities, any attempt to fully explain past price changes or predict future prices is difficult. 4/ Nevertheless, judgments must be made as a basis for present decisionmaking.

For this study the assumption was made that soybean oil and meal would be the most likely products to be imported to meet Vietnamese demands. This assumption was based largely on the fact that previous Vietnamese imports have involved these products and they have evidently achieved a large measure of acceptance. Due to the difficulty of constructing a consistent time series of prices at other world market points, it was further assumed that U.S. soybean oil and meal prices could serve as the basis for estimating world prices. This assumption appears to be justified by the facts that the United States is the major exporter of these products and world prices are highly interrelated. Since the most consistent price series relate to crude, bulk soybean oil and bulk soybean oil meal at Decatur, Illinois, these series were used as the basis for projecting future prices. Additional costs associated with refining, packaging, and transportation were added to these prices to estimate total costs of imported products in S. Vietnam.

Past and Projected Soybean Oil and Soybean Meal Prices

Average U.S. soybean oil and meal prices since 1960 are summarized in Table 5. World demand for fats and oils during the past 10 years has been growing at about 3 percent per year. As a consequence, oil prices have been increasing in recent years. The price of oil during the 1970 season was the highest price in over a decade.

World demand for oilseed meal has also grown as livestock and poultry numbers have increased. In addition, improved feeding methods involving larger proportions of protein in rations has caused expansion in world meal consumption and demand. However, a large proportion of the protein meal traded in world markets is fishmeal.

4/ An exhaustive study of this subject is reported in: World Supply and Demand Prospect for Oilseeds and Oilseed Products in 1980 with Emphasis on Trade by the Less Developed Countries, Foreign Agr. Econ. Rpt. No. 71, ERS, U.S. Department of Agriculture, March 1971.

Table 5.--Soybean oil and meal prices, 1960-1970

Year beginning October 1	Soybean oil 1/		Soybean meal 2/	
	US$/lb.	US$/M.T.	US$/S.T.	US$/M.T.
1960	.113	249	60.60	66.80
1961	.095	209	63.60	70.10
1962	.089	196	71.30	78.60
1963	.085	187	71.00	78.20
1964	.113	249	70.20	77.40
1965	.118	260	81.50	89.80
1966	.101	223	78.80	86.80
1967	.084	185	76.90	84.70
1968	.084	185	74.10	81.70
1969	.112	247	78.40	86.40
1970	.128	282	78.50	86.50
Ave. 1966-70	.102	225	77.34	85.20

1/ Crude, bulk oil, Decatur, Illinois.

2/ Bulk, Decatur, Illinois.

Oilseed producers throughout the world tend to expand output in line with price increases. However, year to year changes in production are largely confined to annual oilseed crops such as soybeans, sunflowers, rape, and peanuts. In the longer run, changes in acreages of tree nuts significantly affect oil production and once trees reach bearing age their production continues for many years. Such is the case now as large acreages of oil palms are coming into production and increasing quantities of palm and coconut oil are beginning to arrive on the market. These larger supplies can be expected to depress world oil prices somewhat during the next few years.

Taking these supply and demand conditions into account and realizing the uncertainty with respect to oil and meal prices at any one point in time, the assumption was made that the average prices of both oil and meal over the past 5 years are reasonable approximations of the prices to be expected during the next 3 to 5 years. These averages are also shown in Table 5 and are used as the basic prices for estimating import costs for S. Vietnam.

Additional Costs and Margins Associated with Imported Oil and Meal

Facilities for refining and packaging vegetable oil in S. Vietnam are very limited. This means that crude, bulk oil must be refined and packaged elsewhere before it can be used to meet these demands. The cost of converting crude oil to refined oil was estimated at about 2 cents per pound, or

approximately $44 per metric ton. Packaging in one quart or one liter cans was estimated to cost about $150 per metric ton. The larger swine and poultry operations and commercial feed manufacturers in S. Vietnam could probably receive meal in bulk; therefore, it was assumed that no further processing or packing would be required for that product.

The cost of transporting oil and meal involves two segments. Since the basic pricing point was Decatur, Illinois, the first segment involves the cost of transporting the products to U.S. ports. Rail freight rates from Decatur to New Orleans for crude, bulk oil and bulk meal were used as estimates of this segment of cost. These are about $22 per metric ton for oil and about $14 per metric ton for soybean meal.

The more important segment of transportation costs involves the ocean freight from U.S. to S. Vietnamese ports. Three sets of ocean freight rates from New Orleans to Saigon are shown in Table 6 for both soybean oil and meal. There is a tremendous difference between the U.S. and foreign flag rates, particularly for meal. In this study, we assume bulk meal shipments with the lowest rate applicable.

Since packaging facilities in S. Vietnam are inadequate for the quantities of oil involved, this product must be imported in cases. Consequently, the higher conference liner rate was assumed to be applicable. However, in light of the freight differentials involved, it would appear that further study of the feasibility of expanding packaging facilities and importing bulk oil may be in order.

Expected Total Delivered Costs, Foreign Exchange Requirements, and Product Prices for Imported Oil and Meal

The basic price and additional cost estimates described in the previous sections are summarized in Table 7. The expected total delivered costs are U.S. $505/M.T. for refined soybean oil in small containers and U.S.$119/M.T. for soybean oil meal. If it is assumed that the annual import requirements (in addition to present domestic supplies) will be 35,000 M.T. of oil and 55,000 M.T. of meal, then more than U.S. $24 million/year in foreign exchange would be required to finance these imports ($17,675,000 plus $6,545,000).

If it is further assumed that the exchange rate for U.S. and Vietnamese currency will be VN$410/US$1, the expected Vietnamese equivalent costs of imported products would be as shown on line 8 of Table 7. Additional costs such as handling, dockage, dock storage, and other margins associated with imports were estimated to be 8 percent of these unit costs. This would result in net prices to wholesalers in Saigon (and presumably in other port cities in South Vietnam) of approximately VN$206 per liter for oil and VN$53/kg. for meal. In the absence of import duties (or other special taxes levied against imported products and not against domestic products) or import subsidies (including preferential exchange rates), these prices represent approximations of the competition which domestic oilseed processors would have to face in attempting to supply these markets.

Table 6.--Ocean freight rates, U.S. Gulf/Saigon

	Foreign flag	U.S. flag
I. Bulk Rates: (Negotiated rates) 1/		
A. Soybean oil--10,000 ton vessel	$22.00 per M.T./F.D.	$35.00 per M.T./F.D.
B. Soybean meal--15,000 ton vessel	18.00 per M.T./F.D.	54.00 per M.T./F.D.
II. Conference Liner Rates 2/ (Published rates filed in tariff)		
A. Soybean oil, packed in cans, drums, etc.	$58.50 per S.T. base rate	
	+2.25 per S.T. bunker surcharge	
	+3.00 per S.T. war risk surcharge	
Total Rate	$63.75 per S.T.	
B. Soybean meal	$42.35 per S.T. base rates	
	+2.25 per S.T. bunker surcharge	
	+3.00 per S.T. war risk surcharge	
Total Rate	$47.60 per S.T.	

1/ Bulk rates are FD. -- free out to the ship -- the cargo pays for the discharging costs.

2/ Liner rates include loading and discharging costs.

Source: Ocean Transportation Division, Export Marketing Service, USDA.

Table 7.--Estimated annual future costs, foreign exchange requirements, margins, and prices for imported soybean oil and meal

Cost element or description	Soybean oil	Soybean oil meal
1. Expected price--Decatur, Illinois (crude, bulk oil and bulk meal)	US$ 225/M.T.	US$ 85/M.T.
2. Freight to Gulf ports	US$ 22/M.T.	US$ 14/M.T.
3. Refining margin	US$ 44/M.T.	----
4. Packaging margin	US$ 150/M.T.	----
5. Freight and insurance to Saigon	US$ 64/M.T.	US$ 20/M.T.
6. Total unit costs (CIF)--Saigon	US$ 505/M.T.	US$ 119/M.T.
7. Total foreign exchange required (35,000/M.T. and 55,000/M.T. meal	US$ 17,675,000	US$ 6,545,000
8. Total unit costs (CIF)--Saigon @ VN$410/US$1	VN$ 207,050/M.T.	VN$ 48,790/M.T.
9. Handling, dockage, and other import margins	VN$ 16,564/M.T.	VN$ 3,903/M.T.
10. Expected price to wholesalers	VN$ 223,614/M.T.	VN$ 52,693/M.T.
11. Expected price to wholesalers	VN$ 206/liter	VN$ 53/kg.

EXPECTED COSTS AND RETURNS ASSOCIATED WITH OILSEED PROCESSING IN S. VIETNAM

The development of an oilseed processing industry capable of meeting the potential demands for vegetable oil and oilseed meal in South Vietnam could take a number of forms. Some of the alternatives which might be considered in the near future are evaluated in this section.

Three types of raw-materials were considered. Peanuts and copra were selected since they are traditional oil crops in Vietnam. Soybeans were included due to the present interest in expanding the production of this crop.

Two types of oil-extracting operations were considered. One type involves mechanical screw-presses for removing oil. The other uses the solvent extraction method, but also includes facilities for pre-pressing part of the oil from high oil content materials (peanuts and copra).

The alternative mills are identified by the type of extracting method employed. However, processing, as defined for this study, includes more than oil extracting. Refining and packaging of the oil as well as some minimal level of raw product and finished product storage are also included in the term "processing."

Size or capacity is generally an important consideration affecting processing costs. Three mill sizes were considered in this study. One screw-press mill with a capacity of 30 M.T. of raw product per day currently exists in S. Vietnam. The processing costs associated with this type of operation were recently estimated and reported by Brian. 5/ This plant serves as the basic standard of comparison in this study. Screw-press mills with a raw product capacity of 100 M.T./day were also considered in order to demonstrate the effect of larger capacity on processing costs. Costs of a 100 M.T./day prepress solvent operation were estimated in order to provide a direct comparison between the two types of extracting methods. Finally, a 300 M.T./day prepress solvent plant was considered as a further measure of the economies of size associated with oilseed processing.

Raw Product Requirements and Recovery Rates

Raw product finished product relationships for the types and sizes of oilseed processing operations described above are summarized in Table 8. For purposes of this study, it was assumed that the raw product capacity of a screw press mill would be the same for each of the three oilseeds. It was further assumed, for reasons which will be discussed later, that all mills would operate 300 days per year. Consequently, the total annual raw product requirements for the 30 M.T./day screw press plant was estimated to be 9,000 M.T./year, with 30,000 M.T./year required for the 100 M.T./day plant.

5/ Brian, Ross F., Edible Vegetable Oil Processing in Vietnam. Report prepared for Foreign Economic Development Service, USDA, and USAID -- July-August 1971.

Table 8.--Raw product requirements, recovery rates, and finished product outputs for alternative sizes of oilseed processing plants and types of oilseeds processed

Item	Screw press mills		Prepress solvent mills	
	30 M.T./day	100 M.T./day	100 M.T./day	300 M.T./day
1. Raw product Req. (M.T./yr.)				
a. Copra	9,000	30,000	45,000	135,000
b. Peanuts (shelled)	9,000	30,000	40,000	120,000
c. Soybeans	9,000	30,000	30,000	90,000
2. Recovery rates (% R.P.)				
a. Crude oil				
(1) Copra	50%	50%	64%	64%
(2) Peanuts (shelled)	40%	40%	48%	48%
(3) Soybeans	15%	15%	18%	18%
b. Refined oil				
(1) Copra	46.5%	46.5%	59.5%	59.5%
(2) Peanuts (shelled) 1/	38.0%	38.0%	45.6%	45.6%
(3) Soybeans	14.4%	14.4%	17.3%	17.3%
c. Meal				
(1) Copra	49%	49%	35%	35%
(2) Peanuts (shelled) 1/	60%	60%	52%	52%
(3) Soybeans	82%	82%	79%	79%
3. Finished prod. (M.T./yr.)				
a. Oil				
(1) Copra	4,200	14,000	26,800	80,300
(2) Peanuts (shelled)	3,400	11,400	18,200	54,700
(3) Soybeans	1,300	4,300	5,200	15,600
b. Meal				
(1) Copra	4,400	14,700	15,800	47,300
(2) Peanuts (shelled)	5,400	18,000	20,800	62,400
(3) Soybeans	7,400	24,600	23,700	71,100

1/ Some additional hulls are added to residue to produce cake and meal.

Raw product utilization by prepress solvent plants was assumed to be governed by the capacity of the solvent extraction unit. While soybeans require some preparation before extraction, essentially all of the material goes through the extractor. Therefore, the total volume of soybeans required is the same as the capacity of the extractor. For the 100 M.T./day operations, 30,000 M.T. per year is again required, while 90,000 M.T. per year would be needed for the 300 M.T./day plant.

In the case of peanuts and copra, roughly half of the oil is assumed to be removed by mechanical pressing before the remaining material is put through the extractor. Therefore, the total raw product requirement is greater than the capacity of the extraction unit. Annual raw product requirements for copra were estimated to be 45,000 M.T. and 135,000 M.T. in the two plant sizes. Annual peanut requirements (shelled peanuts) were estimated at 40,000 M.T. and 120,000 M.T. in the two prepress solvent plants.

Recovery of oil and meal per unit of raw product is basically a function of the oil content of the oilseed and the extraction process employed. However, additional variations in recovery rates occur among individual plants and among specific sources and qualities of raw product. Estimates of recovery rates which might be expected in Vietnam for each raw product and type of plant are also shown in Table 8. Recovery rates on both a crude oil and a refined oil basis are shown. The difference between these two rates represents the refining loss. These should be considered as approximations based on published data as well as observations made by persons familiar with oilseed processing.

The annual outputs of refined oil and oilseed meal for each operation are also shown in Table 8. These are simply the products of the annual volumes of raw product required times the expected recovery rates. Again, these volumes are based on an assumed 300-day operating season.

Capital Requirements and Costs for Oilseed Processing Plants

Estimates of the total investment in buildings and equipment for the different types and sizes of oilseed processing facilities are shown in Table 9. Building investment includes a minimal amount of raw product and finished product storage space, office and laboratory space, and, of course, housing for the processing operations (including oil refining and packaging). In a similar vein, equipment investment includes raw product handling and preparation equipment, oil extraction facilities, oil refining and packaging equipment, and finished product handling equipment. Equipment costs also include installation and fabrication costs.

Building and equipment requirements and investment costs for the 30 M.T./day screw press plant were taken from the Brian report, cited previously. However, the equipment cost in Vietnamese dollars was computed using an exchange rate of VN$410/US$1 instead of VN$350/US$1 assumed by Brian.

Table 9.--Investment requirements and annual capital costs for alternative sizes of oilseed processing plants and types of oilseed processed

Item	Screw press mills		Prepress solvent mills	
	30 M.T./day	100 M.T./day	100 M.T./day	300 M.T./day
	- - - - - - - -	- - - VN$ 1/	- - - - - - - -	
1. Initial investment				
a. Equipment (installed)	275,000,000	550,000,000	682,650,000	1,365,300,000
b. Buildings (including site prep engineering, etc.)	150,000,000	300,000,000	375,000,000	750,000,000
c. Total	425,000,000	850,000,000	1,057,650,000	2,115,300,000
2. Annual capital costs				
a. Equipment depreciation (10 yrs. st. line)	27,500,000	55,000,000	68,265,000	136,530,000
b. Building depreciation (25 yrs. st. line)	6,000,000	12,000,000	15,000,000	30,000,000
c. Repairs and maintenance (10% of equipment costs)	27,500,000	55,000,000	68,265,000	136,530,000
d. Interest, insurance, etc. (20% of total investment)	85,000,000	170,000,000	211,530,000	423,060,000
e. Total	146,000,000	292,000,000	363,060,000	726,120,000
3. Cap. costs/M.T. raw product				
Copra	16,222	9,733	8,068	5,379
Peanuts	16,222	9,733	9,077	6,051
Soybeans	16,222	9,733	12,102	8,068

1/ Exchange rate = VN$410/US$1.

Investment requirements for the other type and sizes of plants were estimated on the basis of relationships derived from an earlier, detailed study of U.S. soybean processing. 6/ The resulting estimates were corroborated by data from numerous other published sources, observations of research personnel familiar with oilseed processing, and price quotations supplied by U.S. oilseed processing equipment manufacturers. However, the figures shown must be considered as approximations and not necessarily actual investment requirements.

It may be noted that no investment is shown for land. A tremendous variation in land values for processing plant sites exists in Vietnam. For example, plant sites may be provided free in an industrial park. At the other extreme, a plant site in downtown Saigon or Cholon would be very costly. With this in mind, the assumptions of no land costs could be interpreted in two ways--first, that a free plant site would be used; or second, that the values of purchased plant sites will continue to increase so that there is no real cost associated with land ownership. Nevertheless, a firm planning to establish an oilseed processing plant may need additional capital to purchase land, depending on the location chosen.

Estimates of the annual costs associated with capital for oilseed processing operations are shown in four categories (Table 9). Equipment depreciation was set at 10 percent of the initial cost. This assumes a 10-year life, on the average, for all equipment, with no salvage value allowance. Building depreciation was computed in the same manner, except a 25-year economic life was assumed.

Repair and maintenance costs are often designated as operating costs rather than capital costs. However, they are basically concerned with maintaining the usefulness of capital goods and are shown with capital costs in this study. U.S. repair and maintenance costs are generally lower than 10 percent of equipment value, as shown in Table 9. However, this higher cost was considered appropriate for Vietnam due to the high cost of spare parts and the possibility that foreign technicians may have to be brought in at various times.

The last category under annual capital costs involves interest, insurance, and any other charges which might be associated with plant ownership. A charge of 20 percent of the initial investment in buildings and equipment was assessed for this category. Interest charges of 20 percent or greater are not uncommon for borrowed funds in S. Vietnam. However, it should be recognized that the entire amount of initial investment is not outstanding over the life of the facilities. As depreciation accounts accrue, the level of investment declines. Under the assumptions specified in relation to depreciation, an average of one-half of the initial investment would actually be outstanding

6/ Brewster, John M., Mitchell, Julia A., and Clark, Stanley P., Size of Soybean Oil Mills and Returns to Growers, Marketing Research Report No. 121, Agricultural Marketing Service, U.S. Department of Agriculture, November 1956.

over the life of the facilities. Consequently, half of the total charges shown in this cost category in Table 9 should be considered as interest on medium and long-term capital. The remaining half is estimated as the interest costs for operating capital, premiums for fire or other calamity insurance, and other related costs and contingencies. Actual costs could be expected to vary depending on the financial conditions and operating policies of individual firms.

The third section of Table 9 shows the estimated capital costs per metric ton of each oilseed, processed in each type and size of facility. These were computed by dividing the total annual capital costs by the annual raw product requirements, as shown previously in Table 8. At this point the necessity for a relatively long annual operating season should be clear. Total annual capital costs are relatively constant regardless of the volume of oilseeds processed. Consequently, the longer the plant operates, the more product that can be processed, and the lower the cost per unit. However, the uncertainty of raw product supplies as well as the likelihood of down time for holidays and plant repairs seemed to dictate a season of no longer than 300 days in South Vietnam.

Costs, Revenues, and Raw Product Values for Alternative Oilseed Processing Operations

The estimated capital costs per metric ton of raw product described in the previous section are repeated on the first line of Tables 10 and 11. Estimates of other categories of oilseed processing costs are shown in the same section of those tables. The procedures used for estimating each of these cost categories were similar to those used in estimating investment requirements. Again, the costs reported by Brian for the 30 M.T./day screw press plant were adjusted on the basis of the Brewster, et al., report, with the resulting estimates corroborated by other available data or independent observations.

Labor costs constitute a relatively minor portion of total processing costs. This simply attests to the fact that modern oilseed processing tends to be capital intensive rather than labor intensive. The labor costs estimated by Brian were based on an average wage per worker (average for all skill levels) of VN$1,000/day. An allowance for managerial salaries and an allowance of 25 percent of total wages and salaries for fringe benefits were also included in Brian's estimation for the 30 M.T./day plant. In light of the method used in computing costs of other sizes and types of plants, these same estimates would apply.

One of the most expensive items shown in the processing costs section of Tables 10 and 11 involves packaging materials. As stated previously, it was assumed that oil would be packed in 1-liter cans while meal would leave the plant in bulk. The amount of packaging material required per ton of raw product is, therefore, a direct function of the oil content of the oilseed and the method of processing. For example, copra processed in screw press mills was estimated to yield 465 kg. of oil per ton of copra (46.5 percent recovery).

Table 10.--Estimated revenues, costs, and returns to raw product for screw press mills processing alternative oilseeds

Item	30 M.T./day capacity			100 M.T./day capacity		
	Copra	Peanuts (shelled)	Soybeans	Copra	Peanuts (shelled)	Soybeans
	VN$/M.T. of raw product					
1. Processing costs 1/						
a. Capital costs	16,200	16,200	16,200	9,700	9,700	9,700
b. Labor and salary costs	1,400	1,400	1,400	700	700	700
c. Packaging materials costs	11,400	9,100	3,400	11,400	9,100	3,400
d. Other costs	5,900	5,200	3,500	7,100	6,300	4,300
e. Total processing costs	34,900	31,900	24,500	28,900	25,800	18,100
2. Revenue						
a. Oil 2/	104,000	85,000	32,200	104,000	85,000	32,200
b. Meal 3/	12,900	31,600	43,200	12,900	31,600	43,200
c. Total	116,900	116,600	75,400	116,900	116,600	75,400
3. Net value of products	82,000	84,700	50,900	88,000	90,800	57,300
4. Implied raw product prices	(82/kg.)	(85/kg.) 4/	(51/kg.)	(88/kg.)	(91/kg.) 4/	(57/kg.)

1/ Processing costs include costs of refining and packaging oil.

2/ All oil valued at import price for refined soybean oil (VN$ 248,500/M.T.).

3/ Soybean and peanut oil meal valued at import price for soybean oil meal (VN$ 58,500/M.T.). Copra meal valued at 50 percent of soybean oil price due to lower protein content.

4/ Approximate equivalent prices for peanuts in shell are VN$ 60/kg. for the 30 M.T./day plant and VN$ 64/kg. for the 100 M.T./day plant.

Table 11.--Estimated revenues, costs, and returns to raw product for prepress solvent mills processing alternative oilseeds

Item	100 M.T./day capacity			300 M.T./day capacity		
	Copra	Peanuts (shelled)	Soybeans	Copra	Peanuts (shelled)	Soybeans
	VN$/M.T. of raw product					
1. Processing costs 1/						
a. Capital costs	8,100	9,100	12,100	5,400	6,100	8,100
b. Labor and salary costs	1,100	1,100	1,100	700	700	700
c. Packaging materials costs	14,600	10,900	4,100	14,600	10,900	4,100
d. Other costs	7,500	6,700	4,500	8,700	7,700	5,200
e. Total processing costs	31,300	27,800	21,800	29,400	25,400	18,100
2. Revenue						
a. Oil 2/	133,100	102,000	38,700	133,100	102,000	38,700
b. Meal 3/	9,200	27,400	41,600	9,200	27,400	41,600
c. Total	142,300	129,400	80,300	142,300	129,400	80,300
3. Net value of products	111,000	101,600	58,500	112,900	104,000	62,200
4. Implied raw product prices	(111/kg.)	(102/kg.) 4/	(59/kg.)	(113/kg.)	(104/kg.) 4/	(62/kg.)

1/ Processing costs include costs of refining and packaging oil.

2/ All oil valued at import price for refined soybean oil (VN$ 248,500/M.T.)

3/ Soybean and peanut oil meal valued at import price for soybean oil meal (VN$ 58,500/M.T.). Copra meal valued at 50 percent of soybean oil price due to lower protein content.

4/ Approximate equivalent prices for peanuts in shell are VN$ 71/kg. for the 100 M.T./day plant and VN$ 73/kg. for the 300 M.T./day plant.

This amount of oil would require approximately 520 1-liter cans @ VN$20 and 34 cases @ VN$30 for a total packaging materials cost of approximately VN$11,400 per metric ton of copra. Since peanuts and especially soybeans yield less oil than copra, packaging material costs per unit of raw product are correspondingly lower. Conversely, since solvent extraction results in higher oil recovery, packaging material costs per M.T. of raw product are higher for prepress solvent operations than for screw press mills.

The "other costs" category shown in Tables 10 and 11 includes items such as electric power, fuel, chemicals, water, and laboratory and office expenses.

Total processing costs are simply the sum of the above mentioned categories. These costs were estimated to include oil refining costs as well as oil extraction and packaging.

The second section of Tables 10 and 11 contains estimates of the revenue per metric ton of raw product which could be expected from sale of oil and meal. Revenue estimates for oil were predicated on the assumption that each of the domestic oils would compete directly with imported soybean oil. The expected price for this imported oil was shown previously in Table 7. It might be noted that coconut oil and peanut oil normally sell at a premium (3-5 cents/pound) over U.S. soybean oil prices. However, it is not known whether these same pricing patterns will exist in Vietnam. If similar patterns do emerge, then the revenues estimated for peanuts and copra are slightly understated.

Estimated revenues from soybean and peanut oil meal were also based on the assumption of direct competition with imported soybean oil meal. Consequently, the expected price for imported meal as shown in Table 7 was used. Prices for meal produced from shelled peanuts have often been above prices of U.S. soybean oil meal. This is probably due to its higher total protein content (50 percent protein for peanut meal vs. 44 percent protein for soybean meal). Furthermore, it seems reasonable that at least part of the peanut meal produced in Vietnam would continue to be used for soy sauce or similar products with a higher use value than for livestock feeding. On the other hand, peanut meal does not contain as high a percentage of certain essential amino acids as soybean meal, and this limits its value in poultry and swine feeding. The problem of aflatoxin, which is sometimes present in peanut meal, further complicates the problem of assessing relative product values. Nevertheless, in the absence of more conclusive evidence to the contrary, it was assumed that the two meals would move at equal prices.

Copra meal contains more fiber and less protein (about 20 percent) than either peanut or soybean oil meal. In the United States, copra meal has, at times, sold for higher prices than soybean oil meal. However, this is reportedly based on its use in dairy cattle rations, which are relatively unimportant in Vietnam at the present time. Copra meal is evidently not satisfactory for most poultry or swine rations. Consequently, it was assumed, somewhat arbitrarily, that copra meal would be sold at only half the price of peanut or soybean oil meal.

The revenue estimates shown in Tables 10 and 11 were computed by multiplying the assumed product prices by the amount of oil and meal obtained per metric ton of raw product. Total revenue is simply the sum of the oil and meal values.

Deduction of total processing costs from total revenue provides an estimate of the average value per unit of raw product. These estimates, shown in the third section of Tables 10 and 11, can be interpreted as average prices which processors would be able to pay for each type of oilseed delivered to the processing plant. They do not include an allowance for raw product assembly or storage, except for the minimal storage provided as an integral part of the processing operation. Requirements and costs associated with the storage and assembly functions are discussed in the next section.

PREPROCESSING MARKETING FUNCTIONS FOR OILSEEDS

Several additional functions must be performed between the production and processing of oilseeds. Storage of oilseeds prior to processing is normally required because of:

1. The seasonal nature of oilseed production and harvest.

2. The lower cost of storing oilseeds relative to the increased efficiency of longer processing seasons.

3. The fact that vegetable oil actually stores better in the seed than extracted oil (oil deterioration).

In a similar manner, raw product assembly is necessitated by:

1. The geographical separation of oilseed production from oilseed processing.

2. The lower cost of transporting oilseeds relative to the increased efficiency of larger processing operations.

There are obviously several possible arrangements through which the storage and assembly functions could be performed. For example, oilseeds could be stored on farms where grown and delivered by farmers to the processing plant just prior to processing. Conversely, oilseeds could be purchased by processors at harvest, with the processors performing both the assembly and storage functions. There are also possibilities for intermediate firms (including cooperatives) or "middlemen" to perform one or both of these functions. U.S. oilseed marketing involves all of these methods or arrangements.

In the case of peanuts, a third function is required under the assumption that processing involves shelled peanuts. That is, peanuts should be shelled at some point between harvest and crushing. Again, this could be accomplished at any point between the farm and the processing plant.

Likewise, the production of copra from coconuts could be considered an intermediate marketing function. Copra is evidently produced by the coconut growers now, but this function could be an integral part of the processing operation or some other operation beyond the farm level.

An analysis or even a complete enumeration of all possible systems or institutional arrangements for accomplishing the above functions is again beyond the scope of this report. However, a limited amount of information can be brought to bear on these problem areas.

Soybean and Peanut Storage

Whether oilseeds are stored at the farm, at the processing plant, or at some intermediate location, certain relationships apparently exist with respect to the storage function. First, larger storage units are generally more efficient than smaller ones. This is primarily a reflection of lower initial investment requirements (and consequently lower annual depreciation, interest, and insurance charges) per unit of storage capacity for larger units.

Table 12 summarizes the total initial investment requirements for five sizes of U.S. soybean storage facilities in 1969. While two separate studies were involved using slightly different estimating techniques, definite economies of size can be observed. The U.S. investment requirements per bushel were also converted to S. Vietnamese piasters per metric ton. Whether these are realistic estimates of current investment costs in S. Vietnam is not known. However, they might serve as reasonable first approximations. Data were not available for comparable peanut storage investment requirements, although it appears reasonable to expect similar economies of size for that product.

A second oilseed storage relationship involves the annual cost per unit and the length of the storage period. Annual costs for four different lengths of storage for soybeans in three sizes of facilities are shown in Table 13. The annual costs shown include fixed facilities costs (depreciation, interest, and insurance on the storage facility) as well as labor costs, shrinkage allowances, and other costs (interest and insurance) associated with the ownership of soybeans over different lengths of time. It is actually the last category which causes total costs to increase as the length of the storage increases. Again, these cost estimates are converted to Vietnamese currency equivalents.

Estimated 1969 average costs for handling and storing peanuts in the United States are shown in Table 14. The total U.S. cost per short ton was also converted to S. Vietnamese piasters per metric ton as a rough approximation of the level which these costs might attain in South Vietnam. It

Table 12.--Investment requirements for soybean storage facilities in the U.S., 1969, with conversion to Vietnamese currency equivalents

Storage capacity	Investment requirements 1/	
	US$/bushel	VN$/M.T. 2/
7,500 bu. = 200 M.T.	3/ 1.71	25,940
30,000 bu. = 800 M.T.	3/ .72	10,920
88,000 bu. = 2,400 M.T.	3/ .53	8,040
3,000,000 bu. = 80,000 M.T.	4/ .41	6,220
5,000,000 bu. = 135,000 M.T.	4/ .27	4,100

1/ Includes equipment for handling, drying, and ventilation.

2/ U.S. $/bu. x 37 bu./M.T. x VN$410/US$1.

3/ Source: Hodson, Charles R. and Traylor, Harlon D., An Economic Analysis of Soybean Storage on Farms in Louisiana, A.E.A. Info. Series #22, Agricultural Experiment Station, Louisiana State University and Agr. and Mech. College, August 1970.

4/ Source: Stuart, Clyde, Jr., and Morrison, W. R., Economies of Size in Soybean Processing Plants, Bulletin #743, Agr. Exp. Station, University of Arkansas, Fayetteville, May 1969.

Table 13.--Estimated soybean storage costs in Louisiana, 1969, with conversions to Vietnamese currency equivalents

Months stored	Costs by capacity of storage facility					
	7,500 bu. capacity		30,000 bu. capacity		88,000 bu. capacity	
	US$/bu. 1/	VN$/M.T. 2/	US$/bu. 1/	VN$/M.T. 2/	US$/bu. 1/	VN$/M.T. 2/
1	0.13	2,000	0.11	1,700	0.09	1,400
3	.15	2,300	.14	2,100	.11	1,700
6	.19	2,900	.17	2,600	.15	2,300
9	.22	3,300	.20	3,000	.18	2,700

1/ Source: Hodson, Charles R., and Traylor, Harlon D., op. cit.

2/ US$/bu. x 37 bu./M.T. x VN$410/US$1.

Table 14.--Standardized weighted average costs per ton for handling and storing U.S. farmers' stock peanuts, 1969, with conversion to Vietnamese equivalent 1/

Cost category	Cost
Receiving (U.S.$/S.T.)	$2.53
Load-out (U.S.$/S.T.)	1.54
Combined handling (U.S.$/S.T.)	4.07
Storage (U.S.$/S.T.)	1.72
Average total annual cost (U.S.$/S.T.)	5.79
Average total annual cost (VN$/M.T.) 2/	2,800

1/ Source: Wynn, N. A., and Reimund, Donn A., Costs of Storing and Handling Farmers' Stock Peanuts in Commercial Facilities, 1969, ERS-352, Economic Research Service, USDA, Washington, D.C., February 1970.

2/ Exchange rate = VN$410/US$1.

should be noted, however, that U.S. peanut storage costs are higher than necessary due to the problem of over-capacity in the storage sector.

Raw Product Assembly

No actual cost data were obtained for the assembly function. Since assembly costs primarily involve transportation, and since a separate transportation team was included in the USDA Economic Research Service research effort, more information will be available from subsequent reports. However, two types of general relationships might be postulated for oilseed assembly costs.

First, the assembly cost will be influenced by the geographic orientation of the processing plants; that is, plants can be located in the proximity of the major markets for either or both final products (oil and meal); they can be located in proximity to raw product supplies; or they can be located at some intermediate point. Market orientation tends to minimize finished product transportation or distribution costs but increases raw product assembly costs. Conversely, supply orientation minimizes assembly costs, but increases product distribution costs. The fact that both types of orientation can be observed among oilseed processing plants in the United States and other countries indicates that there is probably no clear-cut optimum orientation. Rather, the circumstances of the particular operation should govern its locations.

A second type of relationship with respect to raw product assembly involves the size of the processing operation, the density of oilseed production in a particular region, and the size of the area from which a plant must draw its supplies. With a given production density (hectares of oilseeds per thousand hectares of total land area), the larger the processing plant, the larger the area from which the plant must draw its supplies. Since transportation costs usually vary directly with distance, larger plants could be expected to incur higher costs for raw product assembly. While this tends to offset some of the economies of size associated with the processing operation, in the United States it has been found that larger plants can usually afford to transport oilseeds over rather long distances.

RECOMMENDATIONS

This study was not designed to completely answer the question of whether increased production and expanded processing of oilseeds in Vietnam should be undertaken. However, it was designed to provide basic information which should be useful in making such decisions.

With this in mind, the following recommendations are made:

1. The GVN and USAID should lend their support to the development of an oilseed processing industry if it is determined that sufficient raw product supplies would be forthcoming with oilseeds valued at or near the derived prices specified in this report.

2. If the decision is made to encourage the development of oilseed processing in Vietnam, then the following additional recommendations are offered:

   a. That the importations of refined vegetable oils and oilseed meal under programs or policies which provide a preferential advantage to imported products relative to domestic products be phased out.

   b. That encouragement be provided for the establishment of processing facilities of sufficient size to achieve at least some of the economies of size associated with oilseed processing (including oil refining and packaging).

   c. That attention be given to the establishment of physical facilities and institutional arrangements for performing such functions as storage, assembly, and transfer of ownership, concurrently with the development of processing facilities.

   d. That consideration be given to importing soybeans or other oilseeds, at least until such time as domestic production becomes sufficient to meet processing requirements.

3. If the decision is made to supply Vietnam's requirements for edible vegetable oil and oilseed meal through imports, then the following recommendations are made.

   a. That consideration be given to the feasibility of importing vegetable oil in bulk and possibly in crude form for further refining and packaging in

S. Vietnam to take advantage of lower ocean-freight rates and reduce foreign exchange requirements.

b. That possibilities be explored for obtaining special price discounts through large scale purchasing or long term contractual arrangements.

4. A systematic survey of Vietnamese consumers should be made to determine their attitudes and preferences with respect to edible fats and oils. The survey should be conducted in such a manner that differences can be discerned among rural vs. urban consumers in different geographic regions of the country. Other factors such as consumer age, level of income, and ethnic background should also be considered.